

Fig. 1

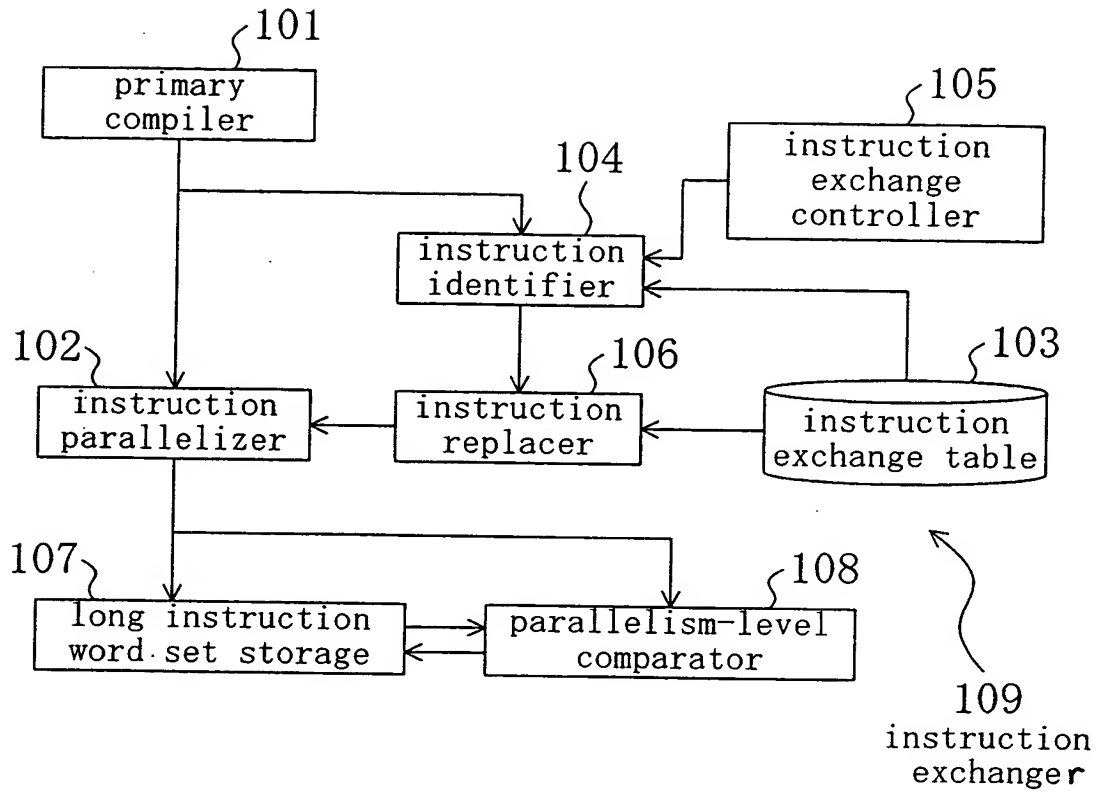


Fig. 2

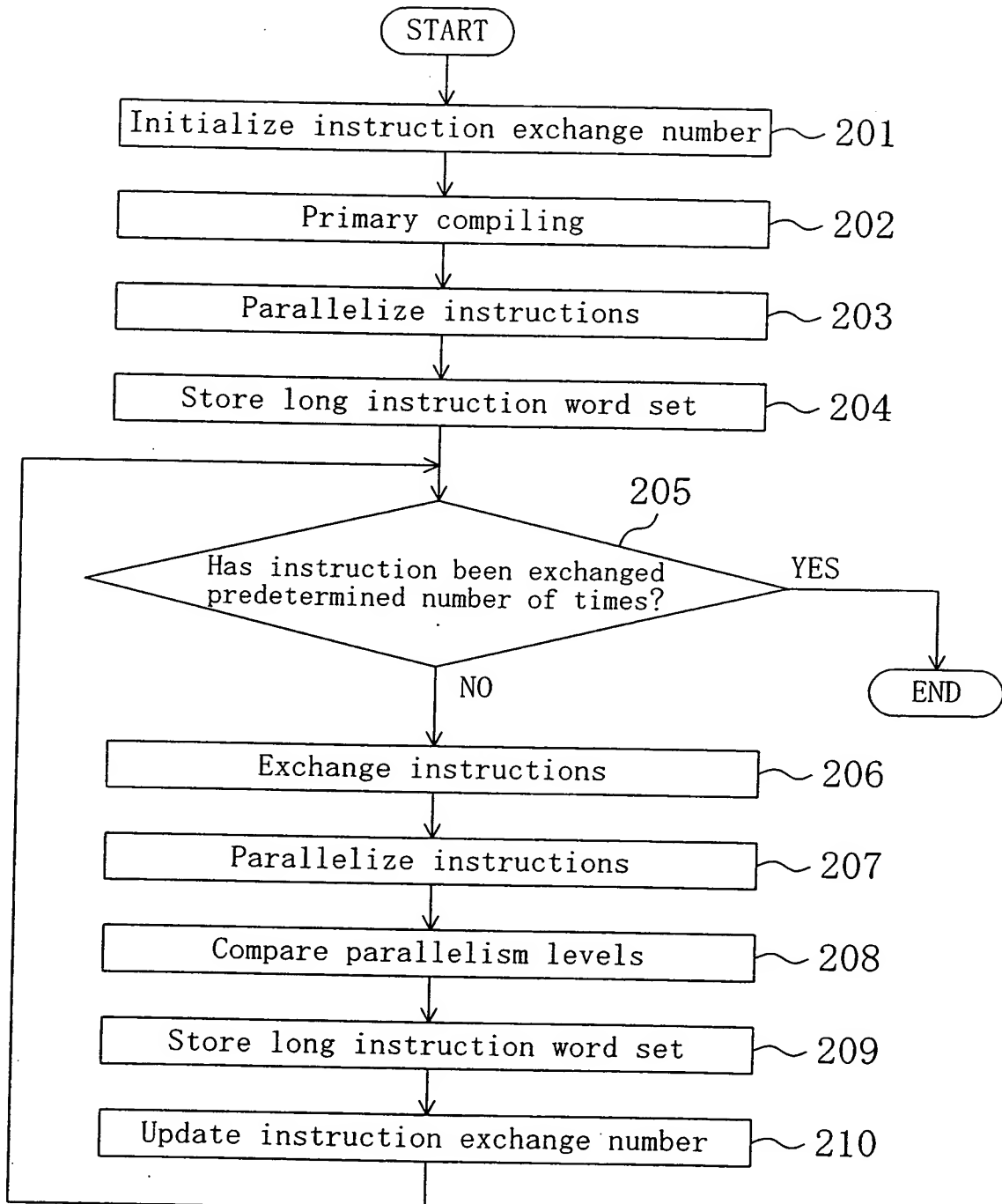


Fig. 3

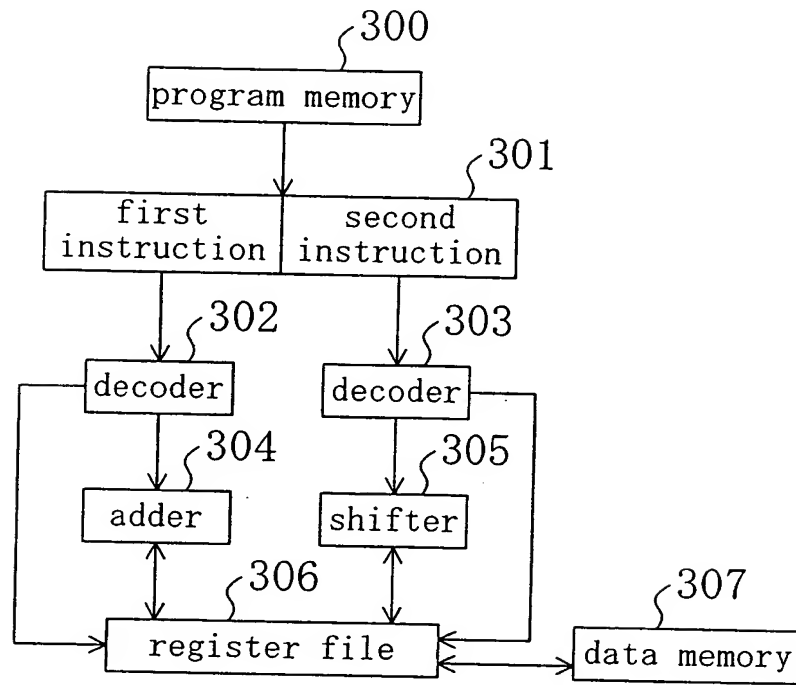


Fig. 4

instruction set

instruction	mnemonic	description	placeable slot		computational resource
			first	second	
ADD	add Rn, Rm	write $Rm + Rn$ on Rm	YES	NO	adder 304
SUBTRACT	sub Rn, Rm	write $Rm - Rn$ on Rm	YES	NO	adder 304
SHIFT LEFT	asl imm, Rm	write $Rm \ll imm$ on Rm	NO	YES	shifter 305
SHIFT RIGHT	asr imm, Rm	write $Rm \gg imm$ on Rm	NO	YES	shifter 305
MOVE	mov Rn, Rm	write Rn on Rm	YES	YES	--
LOAD	ld mem, Rm	write value at mem on Rm	NO	YES	--
STORE	st Rn, mem	write Rn on mem	NO	YES	--
NOP	nop	no operation	YES	YES	--

Fig. 5

instruction exchange table

instruction set 1	add Rm, Rm
	asl 1, Rm

Fig. 6

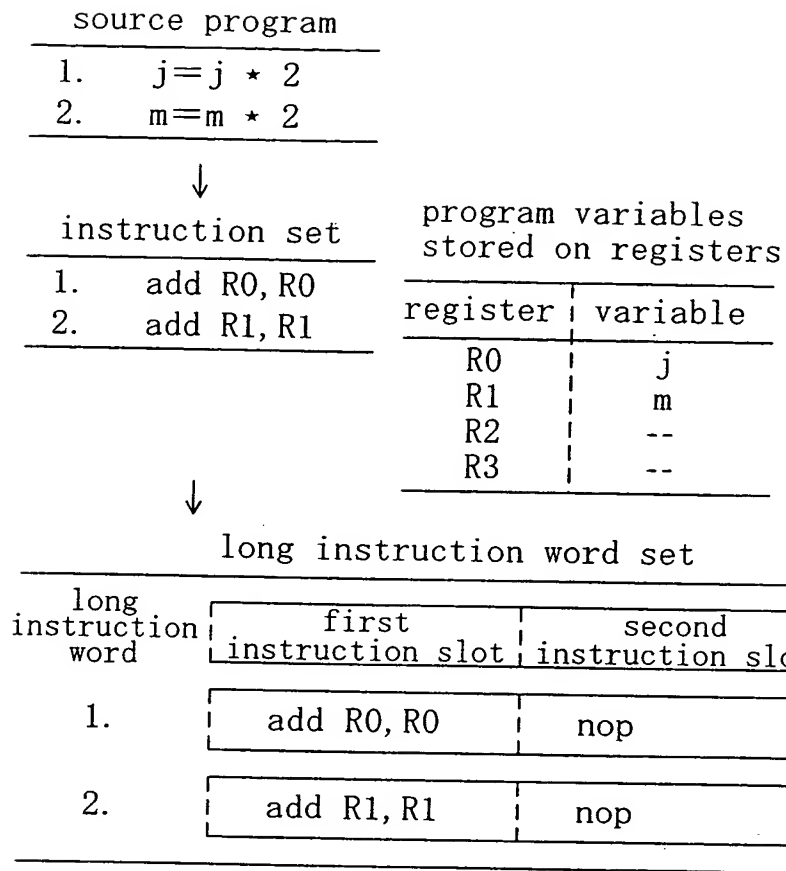


Fig. 7

instruction set	
1.	asl 1, R0
2.	add R1, R1

Fig. 8

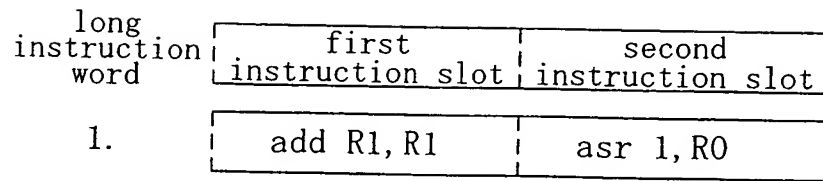


Fig. 9

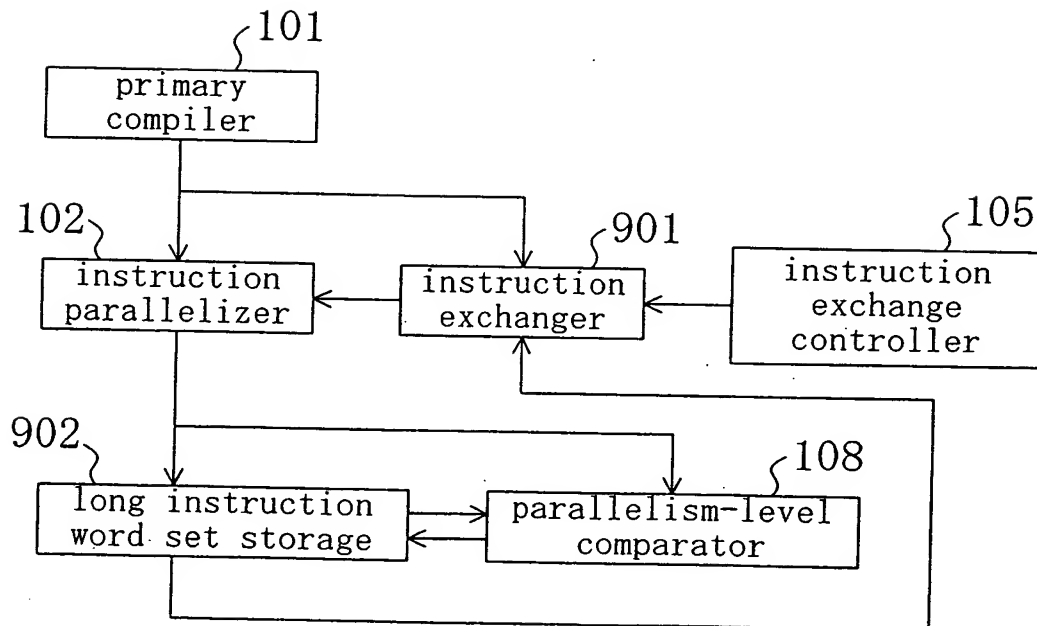


Fig. 10

901 instruction exchanger

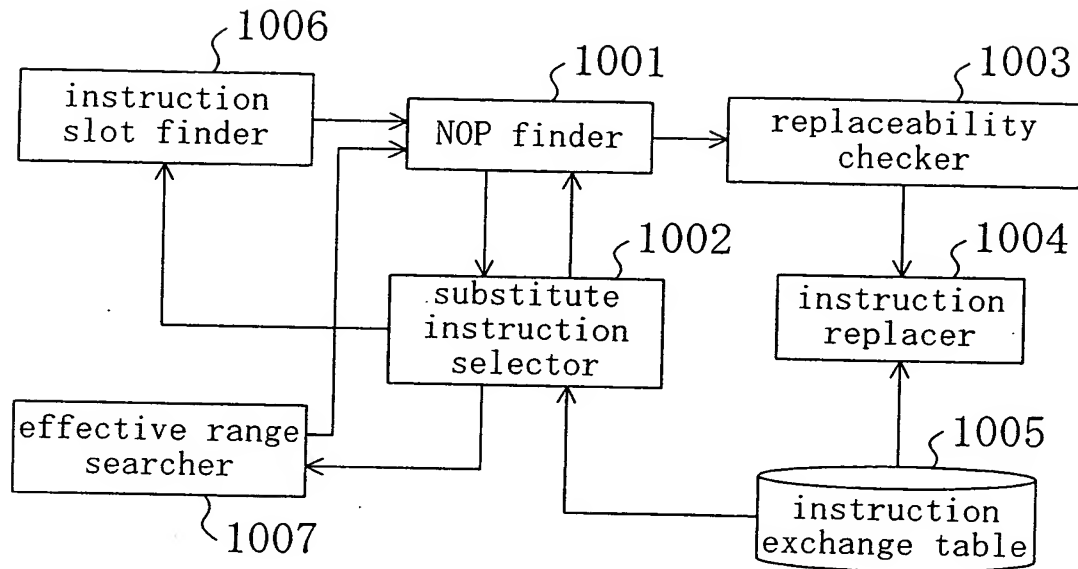


Fig. 11

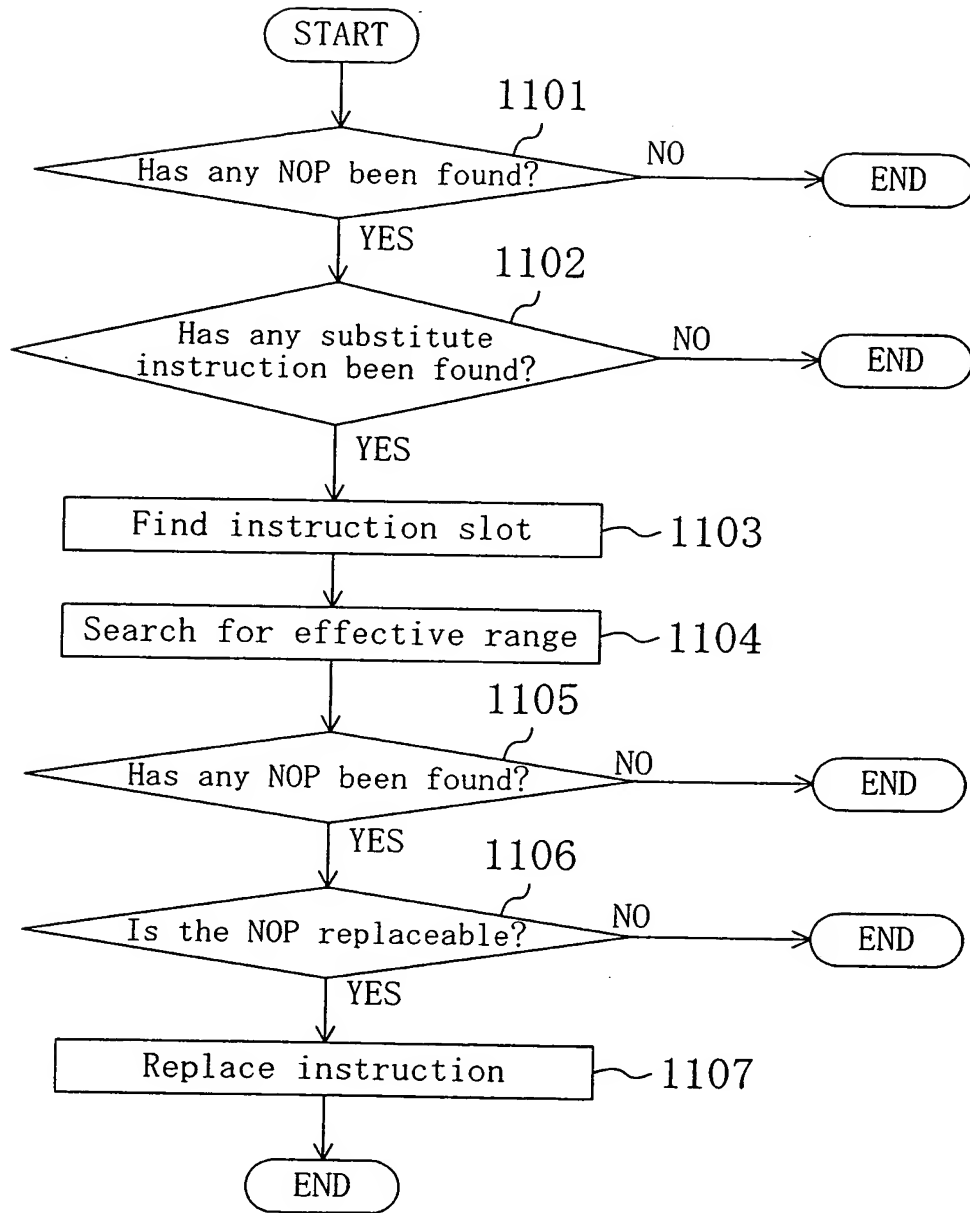




Fig. 12

instruction set

1. add R2, R2
2. asr 2, R1
3. add R1, R1
4. sub R2, R3
5. add R2, R1
6. asl 3, R2
7. add R0, R2

Fig. 13

long instruction word	first                      second	
	instruction slot	instruction slot
1.	add R2, R2	asr 2, R1
2.	add R1, R1	nop
3.	sub R2, R3	nop
4.	add R2, R1	asl 3, R2
5.	add R0, R2	nop

Fig. 14

instruction set

1. add R2, R2
2. asr 2, R1
3. asl 1, R1
4. sub R2, R3
5. add R2, R1
6. asl 3, R2
7. add R0, R2

Fig. 15

long instruction word	first instruction slot		second instruction slot	
1.	add R2, R2		asr 2, R1	
2.	sub R2, R3		asl 1, R1	
3.	add R2, R1		asl 3, R2	
4.	add R0, R2		nop	

Fig. 16

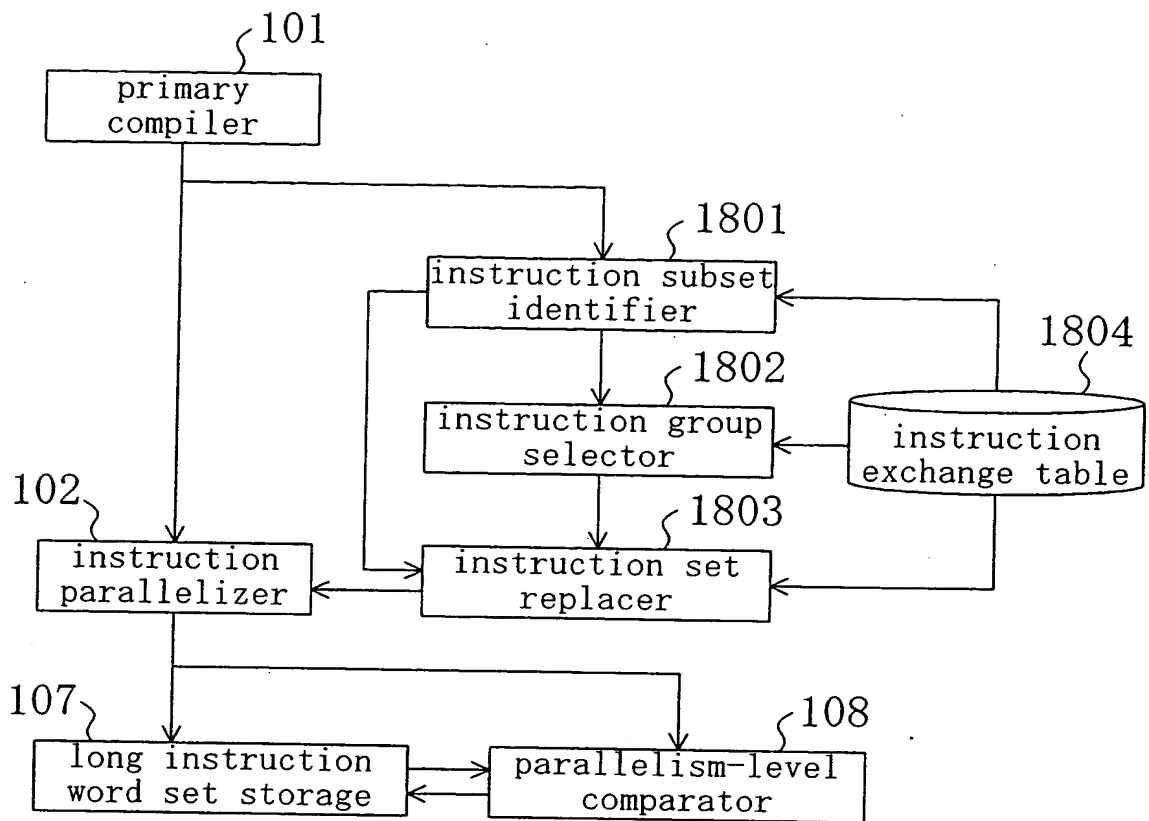
instruction set

1. asl 1, R2
2. asr 2, R1
3. sub R2, R3
4. add R1, R1
5. add R2, R1
6. asl 3, R2
7. add R0, R2

Fig. 17

long instruction word	first		second	
	instruction slot		instruction slot	
1.	nop		asl 1, R2	
2.	sub R2, R3		asr 2, R1	
3.	add R1, R1		nop	
4.	add R2, R1		asl 3, R2	
5.	add R0, R2		nop	

Fig. 18



# Fig. 19

## instruction exchange table 2

instruction class 1	instruction group 1	instruction set 1	1. add Rm, Rm
	instruction group 2	instruction set 2	1. asl 1, Rm
instruction class 2	instruction group 3	instruction set 3	1. mov Rn, Rm 2. asl 1, Rn 3. add Rm, Rn
		instruction set 4	1. mov Rn, Rm 2. asl 2, Rn 3. sub Rm, Rn
	instruction group 4	instruction set 5	1. mov Rn, Rm 2. add Rn, Rn 3. add Rm, Rn

# Fig. 20

## instruction set

1. mov R0, R1
2. asl 2, R0
3. sub R1, R0
4. mov R2, R3
5. asl 2, R2
6. sub R3, R2
7. ld(mem1), R1
8. asl 1, R1
9. st R1, (mem1)

Fig. 21

long instruction word	first                      second	
	instruction slot	instruction slot
1.	mov R0, R1	mov R2, R3
2.	nop	asl 2, R0
3.	sub R1, R0	asl 2, R2
4.	sub R3, R2	ld(mem1), R1
5.	nop	asl 1, R1
6.	nop	st R1, (mem1)

Fig. 22

instruction set

1. mov R0, R1
2. asl 2, R0
3. sub R1, R0
4. mov R2, R3
5. add R2, R2
6. add R3, R2
7. ld(mem1), R1
8. asl 1, R1
9. st R1, (mem1)

Fig. 23

long instruction word	first                      second	
	instruction slot	instruction slot
1.	mov R0, R1	mov R2, R3
2.	add R2, R2	asl 2, R0
3.	sub R1, R0	ld(mem1), R1
4.	add R3, R2	asl 1, R1
5.	nop	st R1, (mem1)

Fig. 24

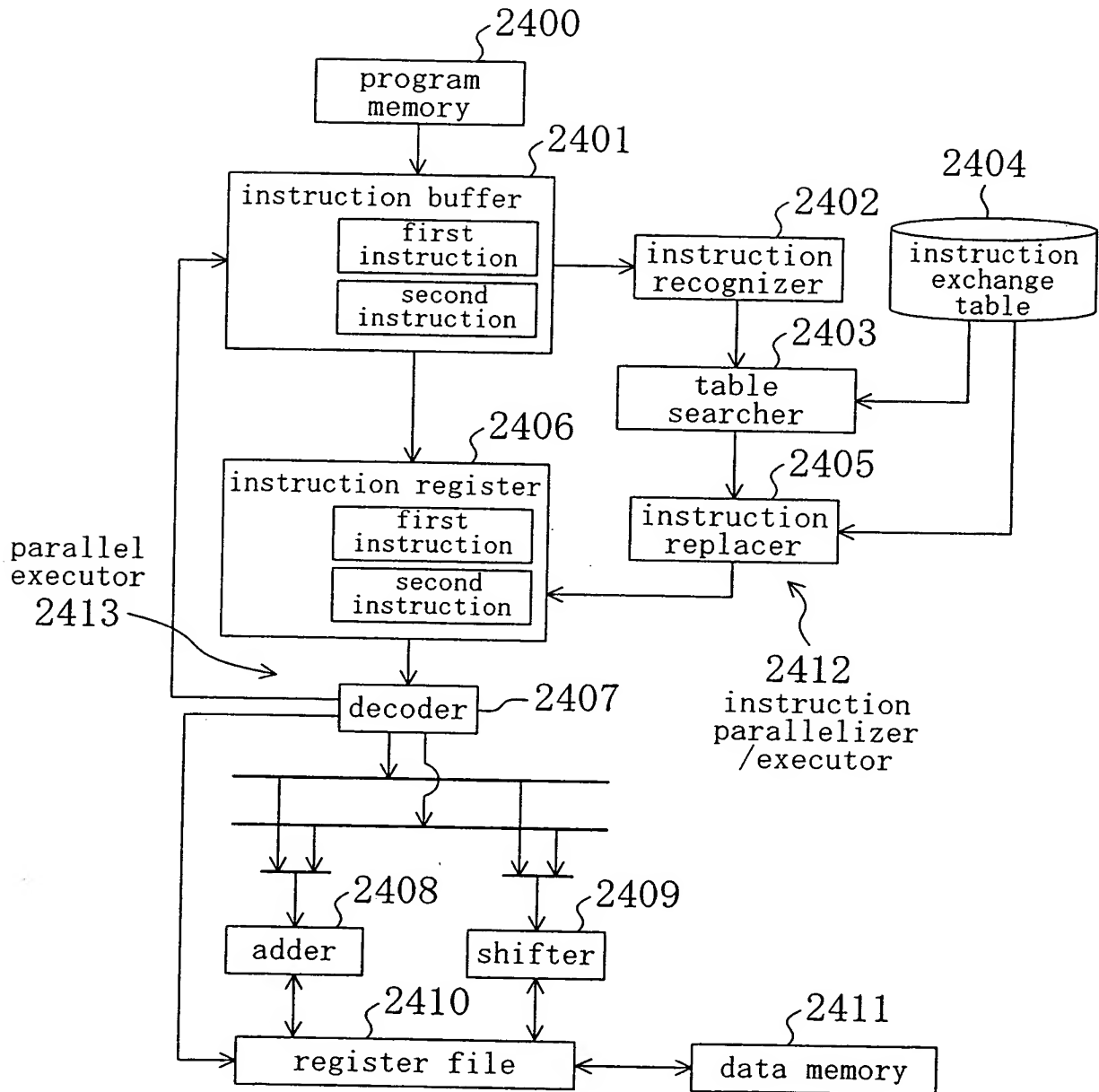




Fig. 25

- A.    add R3, R2
- B.    add R0, R0
- C.    add R1, R1
- D.    sub R2, R0

Fig. 26

- A.    add R3, R2
- E.    asl 1, R0
- F.    asl 1, R1
- D.    sub R2, R0

Fig. 27

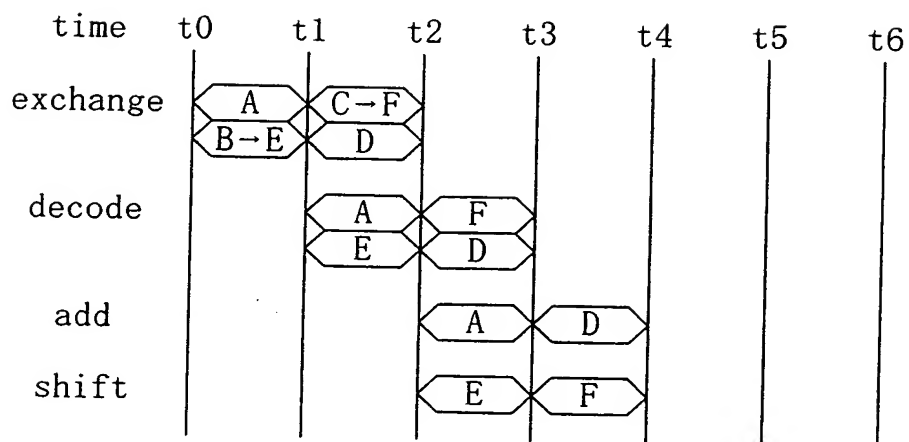


Fig. 28

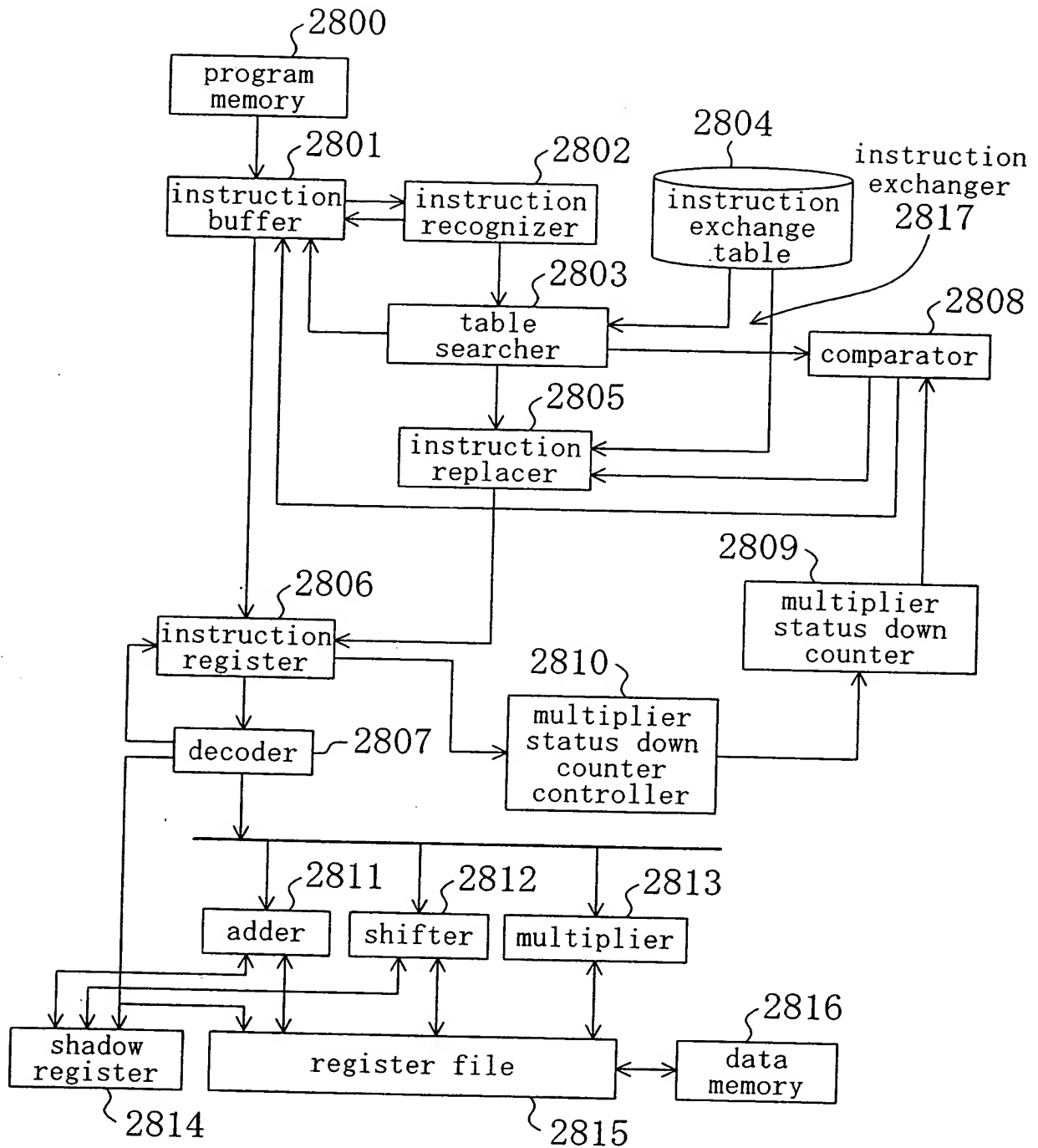


Fig. 29

instruction set

instruction	mnemonic	description	computational resource	execution time (in cycles)
ADD	add Rn, Rm	write $Rm + Rn$ on Rm	adder 3409	1
SUBTRACT	sub Rn, Rm	write $Rm - Rn$ on Rm	adder 3409	1
SHIFT LEFT	asl imm, Rm	write $Rm \ll imm$ on Rm	shifter 3410	1
SHIFT RIGHT	asr imm, Rm	write $Rm \gg imm$ on Rm	shifter 3410	1
MULTIPLY	mul imm, Rm	write $Rm \times imm$ on Rm	multiplier 3411	3
MOVE	mov Rn, Rm	write Rn on Rm	--	1
LOAD	ld mem, Rm	write value at mem on Rm	--	1
STORE	st Rn, mem	write Rn on mem	--	1
NOP	nop	no operation	--	1

Fig. 30

instruction exchange table

instruction group 1	instruction to be exchanged	mul 2, Rm
	set of substitute instructions	add Rm, Rm
	number of substitute instructions	1
instruction group 2	instruction to be exchanged	mul 3, Rm
	set of substitute instructions	mov Rm, RR asl 1, Rm add RR, Rm
	number of substitute instructions	3
instruction group 3	instruction to be exchanged	mul 4, Rm
	set of substitute instructions	asl 2, Rm
	number of substitute instructions	1
instruction group 4	instruction to be exchanged	mul 5, Rm
	set of substitute instructions	mov Rm, RR asl 2, Rm add RR, Rm
	number of substitute instructions	3
instruction group 5	instruction to be exchanged	mul 6, Rm
	set of substitute instructions	mov Rm, RR asl 2, Rm asl 1, RR add RR, Rm
	number of substitute instructions	4
	.....	

Fig. 31

- A. mul 5, R0
- B. mul 3, R1

Fig. 32

- A. mul 5, R0
- C. mov R1, RR
- D. asl 1, R1
- E. add RR, R1

Fig. 33

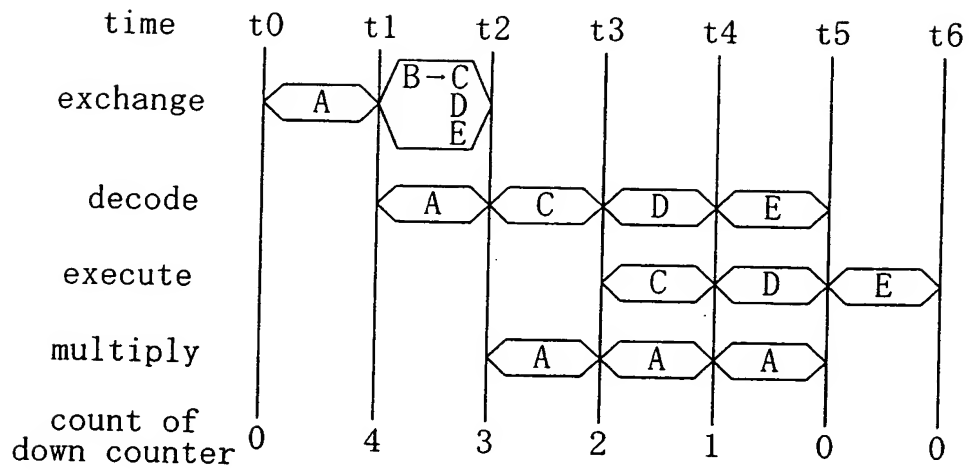


Fig. 34

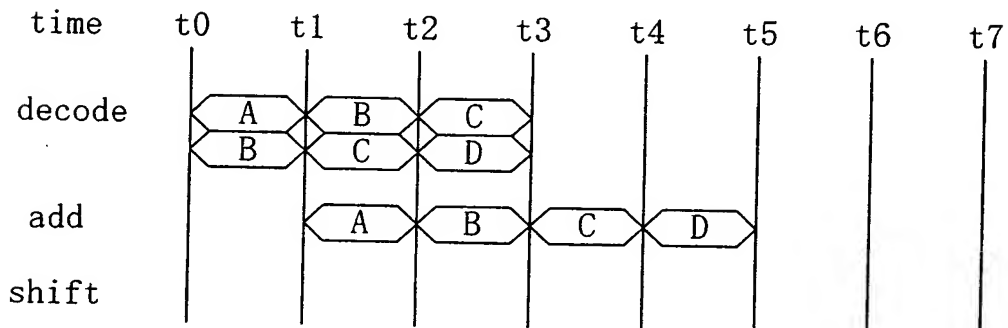


Fig. 35

